

# DISPLAY DEVICE FOR VEHICLE

## BACKGROUND OF THE INVENTION

### Field of the Invention

5           The present invention relates to a display device for a vehicle such as an instrument or the like which is used for a vehicle or the like.

### Description of the Prior Art

          For a vehicle such as an automobile or the like, an instrument panel portion of a front part of a passenger compartment panel is  
10   provided with an indicating instrument (an instrument for a vehicle) having a plurality of instrument parts such as a speed meter, a tachometer, a coolant temperature gauge, odo meter, trip meter, and so on.

          In such an instrument for a vehicle, there is provided that a  
15   peripheral of an instrument part is adopted to be emitted a light with a ring-shaped as described in Japanese Paten Laid-Open 2002-81966.

          However, the instrument for the vehicle according to the above-mentioned Japanese Patent Laid Open has had a very complicated construction and has required much cost for parts.

20           Moreover, as described in Japanese Patent Laid-Open 2000-108722, there is provided an instrument for a vehicle including a small display section having a segment display section and a free display section on a base of indicating needle in a plate with characters.

          However, in the aforementioned instruments for the vehicle, the  
25   small display section is disposed almost in the same plane to the plate with the characters. The small display section and the plate with the characters are seen on a flat plane because the small display section is

visualized as if it is existed almost on the same plane with the plate for characters. Therefore, there has been a problem that a sufficient visual effect can not be obtained.

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## SUMMARY OF THE INVENTION

It is therefore, a first object of the present invention is to solve the above problems, and to provide an instrument for a vehicle which can reduce cost for parts by simplifying a construction.

10 A second object of the present invention is to solve the above problems, and to provide a new visual effect by constructing a small display portion which can be seen as a stereoscopic feeling.

In order to achieve the above first object, according to the present invention, in an instrument for a vehicle which supports a transparent cover with a space from a surface of a plate with characters by an outer  
15 periphery wall member of cylinder shape surrounding a periphery of the surface side of the plate, the transparent cover is formed with a mountain shape in section so as to reflect an outside light toward an inside face of the outer periphery wall member, and the outer periphery wall member is formed by a transparent material having the  
20 similar quality of material with the transparent cover, and a light emitting portion is formed in a tip edge portion of the outer periphery wall member by disposing concealing means in side faces of the outer periphery wall member, and an illumination light from a light source which is disposed in back end of edge portion side of the outer periphery  
25 wall member, and a foot portion of the transparent cover of mountain shape in section is connected to a back end of edge portion of the outer periphery wall member.

As mentioned-above, the outer periphery wall member of cylinder for surrounding the periphery of surface side of the plate with the characters is formed with the transparent material having the similar quality of member with the transparent cover, and the concealing means is applied to the side wall of the outer periphery wall member, then the outer periphery wall member is used as a light guiding unit by disposing the light source in the back end of edge portion side of the outer periphery wall member, and the tip edge portion of the outer periphery wall member can be illuminated as a ring-shaped as the light emitting portion, therefore, a new visual effect can be obtained. Moreover, by connecting the transparent cover and the outer periphery wall member together, a construction can be simplified, and functions can be aggregated, then cost for parts can be reduced.

The concealing means of the side faces of the outer periphery wall member is constructed by means of an internal cylinder member and an external cylinder member, and the outer periphery wall member is adopted to be contained between the internal and external cylinder members. By carrying out the concealing means to the side faces of the outer periphery wall member with the internal and external cylinder members, the concealing means can be conducted securely, and a higher grade of external appearance quality can be obtained.

A light emitting ring member in which an inner periphery face and an outer periphery face of the light emitting ring member is adopted to become the same faces with an inner periphery face of the internal cylinder member and an outer periphery face of the external cylinder member is disposed in a light emitting portion of a tip edge portion of the outer periphery wall member separately from the internal cylinder

member and the external cylinder member. By disposing the light emitting ring member in the light emitting portion of the tip edge portion of the outer periphery wall member, a higher quality for an emission of light of the light emitting portion can be obtained.

5 Moreover, disposing the light emitting ring member separately from the internal and external cylinder members can make a fabrication easy. A sense of continuity and a sense of uniformity can be obtained by disposing the inner periphery and outer periphery faces of the light emitting ring member in the same face with the internal and external  
10 cylinder members.

The light emitting ring member includes a metallic gloss, and a surface treatment of thin layer, which is capable of transmitting an illumination light, is applied to the light emitting ring member. By this surface treatment applied to the light emitting ring member, the light  
15 emitting ring member can be seen as a metallic gloss face when the light emitting ring member is not illuminated, and a colored light which transmits the surface treatment can be seen when the light emitting ring member is illuminated.

In order to achieve the above second object, according to the  
20 present invention, in an instrument for a vehicle in which an indicating needle is disposed rotatably along a surface of a plate with characters, and a transparent cover is disposed separately from the plate in the surface side of the plate, a small display portion is disposed in the transparent cover portion with a floating state. Therefore, a new visual  
25 effect having a stereoscopic feeling can be obtained because the small display portion can be seen as the floating state to a surface of the small display portion.

The small display portion is disposed in a position which is overlapped with a base portion of the indicating needle of transparent cover. By disposing the small display portion in the position which is overlapped with the base portion of the indicating needle, the small display portion can be disposed in a portion which can be seen easily and does not disturb the plate.

The small display portion is contained in a housing, and an outside face of the housing and a base portion of the indicating needle are arranged approximately concentrically, or the outside face of the housing is constructed to have a larger diameter than the base portion of the indicating needle. A good external appearance of the small display portion can be obtained by arranging the outside face of the housing for containing the small display portion and the outside face of the base portion of the indicating needle approximately concentrically or by setting the outside face of the housing to have the larger diameter than the outside face of the base portion of the indicating needle.

Moreover, the outside face of the housing of the small display portion is extended as a taper shape tapering interiorly as approaching to the plate. A wider display area of the plate can be ensured and the housing of the small display portion can be effectively concealed from an eye line by adopting the taper shape for the outside face of the housing of the small display portion tapering interiorly as approaching to the plate.

A passage hole which lets through a harness for supplying power to said small display portion is disposed in a base portion of the indicating needle, and the passage hole is adopted as a non-interference shape in which a harness does not interfere to a rotation of the indicating needle. By disposing the passage hole, which lets through

the harness for supplying the power to the small display portion, in the base portion of the indicating needle, the power can be effectively supplied to the small display portion through the harness. By adopting the passage hole as the non-interference shape with the harness, the harness does not interfere to the rotating indicating needle.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a perspective view showing one embodiment of a display device for a vehicle according to the present invention.

10 FIG.2 is a front view of FIG.1.

FIG.3 is a cross section view of FIG.2.

FIG.4 is a longitudinal section view of the center of an instrument part.

15 FIG.5 is a longitudinal section view of the side portion of an instrument part.

FIG.6 is a perspective view of an indicating needle.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 Embodiments of the present invention will be described as follows with reference to the drawings. First of all, a configuration will be explained. A front part of passenger compartment in a vehicle such as an automobile and so on is provided with an instrument panel P. Such an instrument panel is provided with an indicating instrument or  
25 an instrument for a vehicle 1 as shown in FIGs. 1 and 2. This indicating instrument or this instrument for the vehicle 1 comprises a plurality of instrument parts 2. Each of instrument parts 2 is

constructed by, for example a speed meter 3, a tachometer 4, a coolant temperature gauge 5, a fuel gauge 6 and so on.

Each of the instrument parts 2 comprises a base 11 which includes a plate having a surface on which characters are provided 8  
5 having a rotation area of an indicating needle 7, a movement 9 which rotates the indicating needle 7, a light source 10 of LED or the like for illuminating and so on as shown in FIGs. 3 to 5.

The base 11 is disposed in the reverse face of the plate 8 having a predetermined distance. The plate 8 and the base 11 are contained in a  
10 case 12.

A shaft hole for an indicating needle 13 is formed in an approximately center portion of the rotation area of the indicating needle 7 in the plate 8. An output shaft (an indicating needle shaft 14) of the movement 9 is passed through this shaft hole for the indicating  
15 needle 13. The tip of this indicating needle shaft 14 is provided with a base portion 15 (a rotation center of indicating needle) of the indicating needle 7. The base portion 15 of this indicating needle 7 is provided with an indicating needle cap 16 of approximately cylinder shape.

A display portion of a character scale or the like such as a scale  
20 mark, a value and so on is formed roundly in the periphery portion of the rotation area of the indicating needle 7. Here, the plate 8 comprises a transparent plate made of resin. This plate 8 is printed non-translucently except the display portion of the character scale or the like, and then a translucent display portion of the character scale is  
25 formed. A light guiding unit 17 for guiding an illumination light from the light source 10 to the display portion of the character scale or the like in the plate 8 is disposed in the reverse face of the plate 8.

The plate 8 is an approximately round shape as viewed from the top, and also the plate 8 is an approximately concave shape as viewed from the side face. Correspondingly, the side face shape of the indicating needle 7 is adopted to be a curvature shape along the concave shape of the plate 8. The base portion 15 of the indicating needle 7 is provided with a light source 18 in which the indicating needle 7 is emitted light.

In the instrument for the vehicle 1 of this embodiment, it should be drawn attention that the above each instrument part 2 is adopted as a monocular meter as shown in FIGs. 1 and 2.

In other words, each of the instrument parts 2 is respectively existed by providing outer periphery wall member 21 of tubular shape for surrounding the periphery of the surface side of the plate 8, and then each of the instrument parts 2 is adopted as the monocular meter. The coolant temperature gauge 5 and the fuel gauge 6 are contained in the same outer periphery wall member 21. A triple monocular meter is thereby adopted. Connecting portions 22 of approximately round shape are existed between the outer periphery wall members 21. Each of the outer periphery wall members 21 of triple monocular meter is connected by means of the connecting portion 22 of an approximately round shape by covering the outer periphery wall member 21, and the meter design is thereby constructed. Each of these connecting portions 22 is provided with a warning light 23 and so on.

In this embodiment, one meter of the triple monocular meter will be explained as an example.

As shown in FIGs. 3 to 5, a transparent cover 25 is supported by means of the outer periphery wall member 21 by spacing from the



surface of the plate 8.

The transparent cover 25 is formed as a mountain shape in section, so an outside light is reflected toward the inside face of the outer periphery wall member 21.

5           Moreover, the outer periphery wall member 21 is formed by means of a transparent material having the similar quality of material as the transparent cover 25. Side faces 21a and 21b of the outer periphery wall member 21 are provided with concealing means, so a tip edge portion 21c of the outer periphery wall member 21 is adopted to be  
10   a light emitting portion 26.

          The light source 10 is provided with a back end of edge portion 21d of the outer periphery wall member 21 so as to guide an illumination light from this light source 10 to the light emitting portion 26. The above light source 10 for illumination is disposed in a portion where is  
15   the periphery portion of the plate 8, a back end portion 17a of the light guiding unit 17, and the back end of edge portion 21d of the outer periphery member 21, then the light source 10 is thereby adopted to be shared. For example, LED is used as this light source 10. A plurality of the light sources 10 is disposed in the periphery direction of the outer  
20   periphery wall member 21 with a predetermined space. For instance, about 10 to 12 light sources 10 are disposed.

          A foot portion 25a of the transparent cover 25 having the mountain shape in section is connected to the back end of edge portion 21d of the outer periphery wall member 21.

25           The concealing means of the side faces 21a and 21b of the outer periphery wall member 21 are constructed by an inner cylinder member 28 and an external cylinder member 29, the outer periphery wall

member 21 is contained therebetween. Moreover, the concealing means of the side faces 21a and 21b of the outer periphery wall member 21 can be constructed by coating.

5 A light emitting ring member 31 in which an inner periphery face and an outer periphery face of the light emitting ring member 31 is adopted to become the same faces with an inner periphery face of the internal cylinder member 28 and an outer periphery face of the external cylinder member 29 is disposed in a light emitting portion 26 of a tip edge portion 21c of the outer periphery wall member 21 separately from  
10 the internal cylinder member 28 and the external cylinder member 29.

A surface treatment 32 of thin layer, which has a metallic gloss and can penetrate an illumination light, is applied on the surface of the light emitting ring member 31.

In the instrument for the vehicle 1 of this embodiment, a small  
15 display portion 35 is disposed in the transparent cover 25 to become a floating state to the plate 8. This small display portion 35 is adopted to display, for example, a shifting range display, a direction indication display and so on.

The small display portion 35 can be disposed in any position of  
20 the transparent cover 25, but is preferably disposed in a position where is overlapped with the base portion 15 of the indicating needle 7 of the transparent cover 25. In other words, this small display portion 35 is disposed and fixed in the reverse face of a top portion 25b in the mountain shape of the transparent cover 25.

25 This small display portion 35 is constructed by a short-shaped LCD panel or EL panel, and a diffusion plate 36 is adhered to the rear face of the small display portion 35, then is adopted to be illuminated

from the back of the diffusion plate by a back light 37. For example, LED is used for this back light 37. The small display portion 35, the diffusion plate 36, and the back light 37 are contained in a housing 38 of approximately cylinder shape.

5           The top portion 25b of the transparent cover 25 is formed with an opening portion 39 having a similar diameter to the leading end of the housing 38. A light shielding plate 40 is disposed in the opening portion 39. The above-mentioned small display section 35 is disposed closely to the reverse face of this light shielding plate 40. The circumference of  
10 the housing 38 is supported by means of the edge portion of the reverse face side of the opening portion 39. Moreover, a lens 41 of ring-shaped is projected and formed in the edge portion of the surface side of the opening portion 39.

          It is preferable to construct that an outside face 38a of the  
15 housing 38 for containing the small display section 35 is arranged concentrically with the outside face 15a of the base portion 15 of the indicating needle 7. It is also preferable to construct that the outside face 38a of the housing 38 is to be a larger diameter than the outside face 15a. In other words, the outside face 15a of the base portion 15 of the  
20 indicating needle 7 is constructed to be a smaller diameter than the outside face 38a of the housing 38. A small space 42 is interposed between the outside face 38a of the housing 38 and the indicating needle cap 16.

          Furthermore, it is also preferable for the outside face 38a of the  
25 housing 38 of the small display portion 35 to be adopted as a taper shape tapering interiorly as approaching to the plate 8. The outside face 15a of the indicating needle cap 16 can be adopted as a taper shape tapering

interiorly as approaching to the plate 8.

The indicating needle cap 16, which is disposed in the base portion 15 of the indicating needle 7, is provided with a passage hole 44 which lets through a harness 43 for supplying power to the small display portion 35 and the back light 37. The passage hole 44 is also adopted as a non-interference shape in which the harness 43 does not interfere to the rotation of the indicating needle 7.

Functions of the above-mentioned embodiment will be explained as follows.

According to the embodiment, the outer periphery wall portion 21 of cylinder shape surrounding the periphery of surface side of the plate 8 is formed by a transparent material having the same quality of material with the transparent cover 25, and the side faces 21a and 21b of the outer periphery wall member 21 are arranged as the concealing means, then light source 10 is disposed in the back end of edge portion 21d of the outer periphery wall member 21. Therefore, the outer periphery wall member 21 is used as the light guiding unit 17, and the tip edge portion 21c of the outer periphery wall member 21 can be illuminated with a ring-shaped as the light emitting portion 26, therefore, a new visual effect can be obtained.

Connecting the transparent cover 25 and the outer periphery wall member 21 together can simplify the construction and can aggregate the functions, so parts costs can be reduced.

The concealing means for the side faces 21a and 21b of the outer periphery wall member 21 are provided by using the internal cylinder member 28 and the external cylinder member 29, therefore, the concealing means can be securely carried out, and a higher grade of

external appearance can be obtained as well.

A higher quality of the emission of light of the light emitting portion 26 can be obtained by providing the light emitting ring member 31 in the light emitting portion 26 of the tip edge portion 21c of the outer  
5 periphery wall member 21.

Disposing the light emitting ring member 31 separately to the internal cylinder member 28 and the external cylinder member 29 can make the fabrication easy. Moreover, a sense of continuity and a sense of uniformity can be obtained by providing the inner and periphery faces  
10 of the light emitting ring member 31 on the same face of the internal cylinder member 28 and the external cylinder member 29.

By the surface treatment 32 of the thin layer which is applied to the light emitting ring member 31, the light emitting ring member 31 can be the metallic gloss face when the light emitting ring member 31 is  
15 not illuminated, and a colored light which penetrates the surface treatment 32 can be seen when the light emitting ring member 31 is illuminated.

According to the embodiment, the transparent cover 25 is provided with the small display portion 35 which is adopted to become  
20 the floating state to the plate 8, therefore, the small display portion 35 can be seen as the floating state to the surface of the plate 8, so the new visual effect having a stereoscopic feeling can be obtained.

The small display portion 35 can be disposed in a position which is easy to be seen and does not disturb the plate 8 by disposing the small  
25 display portion 35 in the position which is overlapped with the base portion 15 of the indicating needle 7.

A good external appearance of small display portion 35 can be

obtained by arranging the outside face 38a of the housing 38 for containing the small display portion 35, or by setting the diameter of the outside face 38a of housing 38 larger than the diameter of the outside face 15a of the base portion 15 of the indicating needle 7.

5           By adopting the taper shape for the outside face 38a of the housing 38 of the small display portion 35 tapering interiorly as approaching to the plate 8, a wider display area of the plate 8 can be ensured, and the outside face 38a of the housing 38 of the small display portion 35 can be concealed effectively from an eye line.  
10       Correspondingly, by adopting the taper shape for the outside face 15a of the base portion 15 of the indicating needle 7 tapering interiorly as approaching to the plate 8, a wider display area of the plate 8 can be ensured, and the outside face 38a of the housing 38 of the small display portion 35 can be concealed effectively from an eye line.

15           Power can be supplied effectively to the small display portion 35 through the harness 43 by providing the passage hole 44 which lets through the harness 43. Moreover, by adopting the non-interference shape in which the passage hole 44 does not interfere to the harness 43, the harness 43 does not interfere to the rotating indicating needle 7.

20           The power can be supplied to the small display portion 35 by use of a non-contact type without using the harness 43. In this case, the passage hole 44 is not necessary to be disposed in the base portion 15 of the indicating needle 7.